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美国能源部光伏发电教育示范项目－长城太阳能示范学校

DOE/US Supported PV Education Demonstration Project－Great Wall Solar School)

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1. Program Background

Following the social and economic development, energy demand will be increased. Meanwhile, the increase of energy consumption will be increased the pressure of air pollution. Therefore, energy consumption will be one of the constrains for economic development in China. Currently, there are about 65 million people without electricity. Due to most of the people, who are without electricity supply, are in remote area, with small load requirement and far away from the network. It is could not solve the power supply issue for them in the short time. However, there is with plenty of solar energy resource, which can be one of the options for supplying electricity for the remote population.

It is a huge market potential for solar PV technology and several demonstration sites have been set up by different countries. Based on the cooperation between UNESCO and Chinese Sciences Association, a school solar energy demonstration project was set up in Mancheng, Baoting City of Hebei province in 1996 with total capacity is about 4 kWp. It is the first school PV system in China. In 1999, the World Bank and Ministry of Education of China cooperation project was set up to install solar PV system for 13 schools in Yuan and Hainan. This project armed to supply electricity for remote TV education program, which will install PC computers, TV sets and satellite system. The solar PV systems also supply power for lighting, fans and other applicants for the school daily life power use. The program is benefited both to the daily life and education quality improvement and to the demonstration and publicity of solar PV technology in the remote areas.

But there is no any demonstration site in Beijing area. As the capital, Beijing is the heart of economic and culture in China and it is also a world class tourist city. The solar PV demonstration project in Beijing will be a significant event for the technology development and commercialization.The demonstration in Beijing will be a good site of information dissemination and commercialization of PV technology and it will be resulted in the increasing production and sales of the PV products and enlarge the utilization of PV system. In order to set up a solar PV demonstration site in Beijing, as requested by China/MOA, USA/DOE will support a demonstration project in Beijing area for USA solar PV technology dissemination and commercialization.

2. Project Organization

The project supported by DOE/US. The project organized by China/MOA and designed and installed by Beijing Jike New Energy Technology Development Company. The responsibility of Jike will be for system design, equipment selection and shopping as well as the system installation, training and maintenance.

3. Site Selection

According to the project working plan and sites selection criteria, China/MOA associated with Beijing New Energy Technologies Development Company has made several sites field surveys. After a discussion with Rural Energy Offices in Beijing, the final sites have been selected near the Great Wall for the solar PV system demonstration.

The Great Wall was built up 2000 years ago and it is one of the symbols of China. There are millions of tourists every year. It is good site for PV system demonstration. The village is about 5 km from the Great Wall and its name is Lipao village located in Yanqing County of Beijing. The county is one of the rural energy demonstration counties, which managed by MOA. The local government is fully supporting the demonstration of solar PV system.

4. System Design

Based on the request of the project and the load demand, as well as the effectiveness of demonstration, 300 Wp system was be selected for school and 100 Wp system was selected for the household use. In order to demonstrate the amorphous technology, one 30 Wp amorphous PV system has been designed for the school power system. Since the target of the project is for the demonstration of American solar PV system, the major equipment has been selected the products that made in USA, such as PV panel and converters, which selected by NREL and it shipped directly from USA or from Inner Mongolia. The 500 W inverter system was selected by JIKE from one USA company, which named as Trace. The 150 W inverter system was designed to import from Canada. However, due to the quality problem, final the 150 W inverter was changed to the products, which made by JIKE itself.

4.1. System1：100Wp SHS

No.	Equipment	Numbers
1.	PV panels 100Wp	1
2.	Panel support system	1
3.	Battery of 12V/130Ah	1
4.	Power control box	1
5.	150VA DC/AC inverter	1
6.	SS-10L-12V charge controller	1
7.	AC lighting	4
8.	21 inch color TV set	1
9.	Antenna	1
10.	Cable and others	1

4.2. System2：300Wp school system

No.	Equipment	Numbers
1.	PV panels 300Wp	1
2.	Panel support system	1
3.	Battery of 24V/400Ah	1
4.	Power control box	1
5.	500VA DC/AC inverter	1
6.	SS-20L-24V charge controller	1
7.	AC lighting	4
8.	21 inch color TV set	1
9.	Satellite receiver system	1
10.	3m satellite receiver terrene	1
11.	LNB and Feeder Source	1
12.	Video recorder	1
13.	Cable and others	1

4.3. System3：30Wp amorphous PV system

No.	Equipment	Numbers
1.	30Wp amorphous PV panel	1
2.	Panel support system	1
3.	Charge controller	1
4.	Battery of 12V/38Ah	1
5.	DC lighting	2
6.	Cable and others	1

5. System installation and operation

After the equipment selection and procurement, all the system components were safely delivered to the demonstration sites. As soon as the short training program, the system has been installed and operated in the target village. Due to the short training, teachers and the household master can do the operation activities and simple maintenance.

Up to now, the 3 system operated normally. The 300 Wp system can produce about 1.1 kWh power, which can supply power about 8 hours for the education system and the amorphous system can produce 0.11 kWh electricity, which can supply power for 2 lighting systems in 5 hours. The 100 Wp household system can produce about 0.35 kWh electricity, which can meet the power demand of the household applicants (color TV and lighting) for about 4 hours.

In October 10,1999, the one DOE delegation visited the sites with JIKE staff and mission members were satisfactory for the system installation.

6. Demonstration results

The systems have successfully supplied electricity for school and household by solar PV system. And the education tools have been improved in the school and it is also changed the daily life of the teachers and other beneficiaries. The results can be used of the information dissemination of American solar PV products.

Thanks for DOE/US and MOA/Cina. Jike will carry on the co-operation project between the US and China in the field of renewable energy.